Bioethanol Production From Sugarcane Bagasse Hemicellulose Using Pichia Stipitis

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Background & Objectives: Bioethanol as a renewable energy can be produced from variety of lignocellulosic feedstocks like sugarcane bagasse that is one of the most abundant sources worldwide. The sugarcane bagasse contains cellulose and hemicellulose which could be hydrolyzed to the main structural sugars, glucose and xylose. Since common ethanologenic microorganisms, such as Saccharomyces cerevisiae, could not consume xylose, it is essential to find appropriate substitutes. Among different microorganisms, Pichia stipitis is known as the best xylose fermenting yeast. In this study production of bioethanol from sugarcane bagasse hydrolysate by two different strains of this species is compared.

Methods: Two strains of *Pichia stipitis* (PTCC5309 and PTCC5310) were examined regarding their ethanol production potencies. The ethanol production was investigated both in synthetic and sugarcane bagasse hydrolysate medium. Synthetic medium contained 3% (w/v) and 6% (w/v) xylose, while hemicellulose hydrolysate contained 3% (w/v) total reducing sugars, 2.2% (w/v) of which was pentoses.

Results: Results showed that the ethanol production by PTCC5309 was higher than PTCC5310 in both 3% (w/v) and 6% (w/v) xylose containing synthetic medium. Ethanol production by this strain from 3% and 6% xylose was 6.8 and 15.17 g/l, respectively. The ethanol production by PTCC5309 in hydrolysate medium was 6.47 g/l, which was higher than 5.3 g/l produced by PTCC5310.

Conclusion: The pentose fermenting yeast Pichia stipitis PTCC5309 showed to be superior for ethanol production both in synthetic xylose medium and hemicellulose hydrolysate medium as compared to PTCC5310. Since the hydrolysate medium contains some inhibitory materials, the ethanol production was less than synthetic xylose medium.

Keywords: Bioethanol; *Pichia Stipitis*; Sugarcane Bagasse